SYNTHESIS OF RUTHENIUM AND PLATINUM NANOPARTICLES STABILIZED BY HEAVILY FLUORINATED COMPOUNDS

Mar Tristany,[a] Bruno Chaudret,[b] Philippe Dieudonné,[c] Yannick Guari,[d] Pierre Lecante,[e] Victor Matsura,[d] Marcial Moreno-Mañas,[a] Karine Philippot,[b] and Roser Pleixats.[a]**

[a]*Department of Chemistry, Universitat Autònoma de Barcelona, Cerdanyola, 08193-Barcelona, Spain*

[b]*Laboratoire de Chimie de Coordination du CNRS, 205 route de Narbonne, 31077-Toulouse, France*

[c]*Laboratoire des Colloïdes, Verres et Nanomatériaux (CNRS, UMR 5587), Université de Montpellier II, 34095-Montpellier, France*

[d]*Laboratoire de Chimie Moléculaire et Organisation du Solide (CNRS, UMR 5637) Université de Montpellier II, 34095-Montpellier, France*

[e]*Centre d'Elaboration des Matériaux et d'Etudes Structurales du CNRS, 29 rue Jeanne Marvig, BP4347, 31055-Toulouse, France*

tristany@lcc-toulouse.fr

During the past decade, metal nanostructures have attracted a considerable interest due to their properties in various areas such as optics, magnetism, catalysis...[1] Many efforts have thus been devoted to their synthesis and characterization and various approaches are now available for their preparation, such as chemical reduction, thermal or sonochemical decomposition, UV photolysis, chemical vapour deposition, electrochemical synthesis and organometallic synthesis.[2] However, since both the physical and the chemical properties of nanostructures are dependent on their morphologies,[3] it is necessary to find synthesis methods allowing a good control of their morphology.

In this field, here we describe our collaborative results on the stabilization of ruthenium(0)[4] and platinum(0)[5] nanoparticles by heavily fluorinated compounds, organized into spherical, rod or wire shaped superstructures (figure 1). Such organization results from the combination of an organometallic route[6] leading to size-controled nanoparticles with the use of heavily fluorinated compounds[7] to self-assemble as stabilizing agents (figure 2).

Several techniques were employed to characterize the nanomaterials obtained including TEM, HTEM, WAXS, SEM-FEG and SAXS which confirmed the nanoparticles organization.

Such fluorinated-ligand-stabilized NPs could find application in fluorous biphase catalysis or in materials chemistry.

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Figures:

Figure 1. Superstructures of the nanocomposites of ruthenium(0) (left) and platinum(0) (right) nanoparticles embedded into heavily fluorinated compounds.

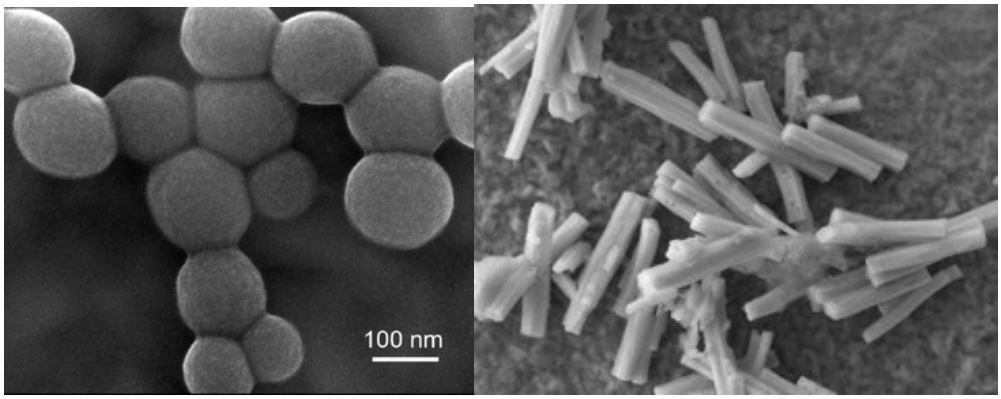

Figure 2 Family of heavily fluorinated compounds used as stabilizing agents for nanoparticles synthesis.